

11-3 Geometric Sequences

-sequence in which each term after the first is found by multiplying the previous term by a constant (common ratio)

ex:

3, 12, 48, ...

$$r = \underline{4}$$

$$\frac{12}{3} = 4$$

$$\frac{48}{12} = 4$$

ex:

100, 20, 4, ...

$$r = \underline{\frac{1}{5}}$$

$$\frac{20}{100} = \frac{1}{5}$$

$$\frac{4}{20} = \frac{1}{5}$$

ex:

2, 6, 18, 54...

$$r = \underline{3}$$

Develop the formula.

$$a_2 = 2 \cdot 3^1 = 6$$

$$a_3 = 2 \cdot 3^2 = 18$$

$$a_4 = 2 \cdot 3^3 = 54$$

$$a_n = a_1 \cdot r^{n-1}$$

To find the nth term:

$$a_n = a_1 \cdot r^{n-1}$$

ex:

3, 9, 27, ...

Find a_7

$$r = 3$$

$$a_7 = 3 \cdot 3^6$$

$$a_7 = 2187$$

ex:

100, 25, 6.25, ...

Find a_5

$$r = \frac{1}{4}$$

$$a_5 = 100 \left(\frac{1}{4}\right)^4$$

$$a_5 = \frac{25}{64}$$

ex:

Write an equation for a_n

5, 10, 20, 40, ...

$$a_n = 5(2)^{n-1}$$

ex:

 $a_7 = \underline{\hspace{2cm}}$ $a_3 = 96$ $r = 2$

$$a_n = a_1 \cdot r^{n-1}$$

$$= a_3 r^{n-3}$$

$$a_7 = 96(2)^{7-3}$$

$$a_7 = 1536$$

Geometric Means--terms between two given terms

ex:

Find three geometric means between 300 and $\frac{6075}{64}$

$$300, \pm \frac{225}{4}, \pm \frac{675}{16}, \pm \frac{2025}{64}, \frac{6075}{64}$$

$$\frac{6075}{64} = 300 r^4$$

$$\frac{81}{256} = r^4$$

$$\pm \frac{3}{4} = r$$

$$\begin{array}{ccc} 225 & \frac{675}{4} & \frac{2025}{16} \\ -225 & \frac{675}{4} & -\frac{2025}{16} \end{array}$$

DO:

Find three geometric means between -3 and -12,288

$$r = \pm 8$$

$$r=8 \quad -3 \quad -24 \quad -192 \quad -1536 \quad -12288$$

$$r=-8$$

$$-3 \quad 24 \quad -192 \quad 1536$$

$$\pm \quad - \quad \pm$$

HW

p591

15, 17, 21, 23, 31- 39odd, 38, 43, 45